Notes - Dimensional Analysis

- It's all about cancelling units!

Roadmap: given unit → → ... → desired unit

↓

Skeleton: Given unit | | unit
1 |

Ex 1: How many seconds are in 3 hours?

Roadmap: hours → min → seconds

$$\frac{3\ \text{hours}}{1} \times \frac{60\ \text{min}}{1\ \text{hours}} \times \frac{60\ \text{sec}}{1\ \text{min}} = \frac{10{,}800}{1} = 10{,}800\ \text{sec}$$

Ex 2: How many cm in 0.5 miles?

miles → feet → inches → cm

$$\frac{0.5\ \text{miles}}{1} \times \frac{5{,}280\ \text{ft}}{1\ \text{miles}} \times \frac{12\ \text{in}}{1\ \text{ft}} \times \frac{2.54\ \text{cm}}{1\ \text{in}} = 80{,}467.2\ \text{cm}$$

Ex 3: Convert 5 mph to cm/sec

(fraction bar)

miles → ft → in → cm   hr → min → sec

$$\frac{5\ \text{miles}}{1\ \text{hour}} \times \frac{5280\ \text{ft}}{1\ \text{miles}} \times \frac{12\ \text{in}}{1\ \text{ft}} \times \frac{2.54\ \text{cm}}{1\ \text{in}} \times \frac{1\ \text{hr}}{60\ \text{min}} \times \frac{1\ \text{min}}{60\ \text{sec}}$$

distance: miles → cm   time: hr → sec

$$= \frac{804672\ \text{cm}}{3600\ \text{sec}} = 223.52\ \text{cm/sec}$$